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## **The Geographic Value of Patient-Carried Medical Records in Improving Healthcare in the US**

The maintenance of medical records has been a mainstay in the American health care system. However, innovation continues to present alternative methods for record keeping. This paper will discuss one such innovative strategy, the patient-carried medical record (PCMR). While medical records typically remain in a clinic, PCMRs are copies of medical records that individuals carry with them, usually in a compact form such as a wallet-sized piece of paper or electronic smart card. Although PCMRs can vary considerably, each presents a unique opportunity to alter the geography of health administration. This paper therefore evaluates the potential benefits of PCMRs for American patients through a geographic framework. First, I will explain how PCMRs operate within the framework of medical geography. From there, I will enumerate several patient complaints regarding the US health care system that PCMRs could potentially mitigate: communication between patient and provider, communication between providers, medical error, and cost. The main section of this paper analyzes PCMRs' geographic solutions to these patient complaints. Finally I synthesize these results to determine the efficacy of PCMRs, taking into account their disadvantages. In total, this paper finds that PCMRs are a valuable tool to alleviate many patients' complaints about American healthcare because they restructure geographic relationships within the health system. However, further research is needed to determine precisely how PCMRs influence health outcomes.

Numerous types of PCMR's have been adopted or tested by clinics, hospitals, and even national governments. All PCMRs differ from standard medical records because patients can access them in locations other than their health providers' office. However, beyond this, there are no universal qualities of PCMRs. Their content varies: some contain a full record of medical history while others contain information related to a certain medical need (only maternal health, for instance). Doctors can update some records continuously throughout a patient's lifetime. Some are meant for patients to fill out themselves between office visits and still others are maintained by providers. Depending on literacy rates, PCMRs encode information differently, using words or symbols. Additionally, some PCMRs require technological infrastructure, such as smart

cards or internet access at home. This research, however, will not examine each unique type of PCMR but will instead evaluate them based on their common properties.

This paper discusses the effectiveness of PCMRs through of lens of the geography of health. According to Dummer, health geography examines the “social, cultural, and political contexts for health within a framework of spatial organization” (2008, p. 1177). In the case of PCMRs, the spatial organization in question is the distribution of medical information within and beyond the walls of a clinic. In other words, because all PCMRs alter the spatial organization of medical records, their effectiveness can be analyzed in a geographic context. Additionally, Dummer notes that health geography is an effective tool for “determining health outcomes” (2008, p. 1180). This statement suggests that methods for organizing medical information across space can actually improve or worsen real measures of health, such as life expectancy. Because this accepted connection between health geography and outcomes exists, this paper will also discuss PCMRs’ effects on health outcomes.

In order to address the applicability of PCMRs to US healthcare, we must first identify some key problems with the current system. One of the most important aspects of healthcare in the US, according to patients, is the quality of communication with their healthcare providers. In a recent survey, ninety percent of respondents said that their doctors’ ability to communicate and listen is a “very important” factor when determining the quality of their health care (Health Confidence Survey, 2005). In addition, patients also recognize the value of communication among providers. Fifty-one percent of polled Americans called “poor communication between doctors, nurses, and pharmacists” a major reason for poor quality healthcare in the US (Harvard School of Public Health/Robert Wood Johnson Foundation Nursing Survey, 2005). A third problem that Americans cite with the US healthcare system is medical error; in fact, forty-one percent of responders said that they or someone they know has been the victim of medical error (Research!America Health Services Poll, 2005). And finally, thirty-four percent of Americans report that affordable healthcare is their “biggest concern,” alongside the “general cost of living” (Healthcare Through Women’s Economic Lenses Survey, 2009). Taken together, these four flaws with the American healthcare system reflect a lack of access to high-quality care that PCMRs can address by restructuring the geography of health.

The first problem that PCMRs address is the lack of communication between patients and doctors because they serve as a physical connection between the two. While communication typically only occurs within a healthcare setting, PCMRs allow medical information to escape this limited space. Because PCMRs increase spatial opportunities for communication, they reinforce the relationship between a doctor and patient that previously only existed in a single space. For instance, a review of British PCMR trials found that PCMRs increase transparency between patients and providers (Gilhooly and McGhee, 1991). One type of PCMR is particularly effective at increasing this

communication: the “participatory record” (Giglio and Papazian, 1986). This type of record—which encourages patients to update their records while away from their provider—increases communication by altering the traditional geographic relationship between patients and providers. Because patients interact with participatory records when away from the office, they can still, in a sense, receive medical care. In this way, participatory records provide opportunities for communication between patients and providers even when physical proximity limits face-to-face communication.

Patient-carried medical records may likely also improve communication among healthcare providers—also known as “continuity of care”—thereby quelling this common complaint from US patients. Normally, physical proximity presents a great obstacle to communication among providers. Patients with PCMRs can serve as a communication bridge between providers by bringing their records from one clinic to another. For this reason, a British study sought to use PCMRs as a means to improve communication between general medical practitioners and general dental practitioners (Jones et al., 1999). At the conclusion of the study, dentists and doctors acknowledged the value of PCMRs since many items in a patient’s medical record are important to both types of practitioner, such as allergy information (Jones et. al, 1999, Box 1). In this example, we see that PCMRs can strengthen relationships among providers. However, further research also suggests that PCMRs can even create geographic networks among providers. When the WHO tested PCMRs for maternal health patients in eight countries, many mothers referred to their portable record as a “passport” (Shah et al., 1993, p. 542). In complex health systems, mothers with PCMRs had better experiences with referrals to clinics where staff were trained to use PCMRs because PCMRs facilitated communication among clinics (Shah et al., 1993). Finally, internet-accessed PCMRs also encourage continuity of care when patients seek medical service outside of a clinic. A study in California found that many PCMR patients used the record as a memory device to recall information, such as dosage and test results, when filling prescriptions for example (Earnest et al., 2004). In this way, PCMRs protect against the loss of medical information that often occurs with time.

Additionally, PCMRs alter the typical geography of health information to reduce medical errors, a major flaw in the US healthcare system. Normally, health records are confined to a restricted space in the health provider’s office. However, patients have much more access to their records if they can be viewed outside of this space, thereby increasing the likelihood that they will find their providers’ mistakes. In one study, twenty-four percent of PCMR patients found mistakes in their records and thirty percent found omissions (Jones et al., 1999, p. 370). This particular advantage has been replicated in several other studies, and has even reduced patient anxiety as a result (Gilhooly and McGhee, 1991). Additionally, because PCMRs encourage networks of communication among providers, the records are more likely contain accurate data (Shah

et al., 1993). In this case, we see that continuity of care can reduce medical error because geographic barriers to communication no longer exist.

While the geographic reasons that PCMRs can lower costs are less obvious, PCMRs could alleviate many geographical costs in the American healthcare system. This paper has already addressed how PCMRs overcome geographic barriers to alleviate three common patient complaints: communication between patient and provider, communication between providers, and medical error. Currently, we overcome these barriers with high administrative costs, around twenty-four percent of total costs (Reinhardt, Hussey and Anderson, 2004, p. 14). However, if PCMRs can distribute medical information more efficiently, costs should decrease. For example, paperwork decreased in the long run at clinics in the Philippines that adopted PCMRs (Shah et al., 1993). In this example, we see evidence that PCMRs will likely lower their healthcare costs. In addition, the fact that PCMRs facilitate communication between patients and doctors means that they have the potential to reduce time costs spent in discussion (Giglio and Papazian, 1986). Similarly, there is also a hope that women who maintain their maternal records between pregnancies at home can save time at the clinic because they will require less time updating records with providers (Shah et al., 1993).

While PCMRs do present geographic solutions to patients' complaints, current research does not indicate any known connection between PCMRs and health outcomes. While the aforementioned benefits would suggest better outcomes with PCMRs (eg, communication between doctors improves outcomes) the majority of PCMR research has yet to determine the relationship between the two: past trials have instead used patient satisfaction as a measure of success (Jones et al., 1999; Shah et al., 1993; Gilhooly and McGhee, 1991; Earnest et al., 2004). However, several studies suggest that the geographic benefits of PCMRs will improve health. In Zambia, 72.5% of PCMR users got tetanus vaccines compared with zero in the control group (Shah et al., 1993). Additionally, this study found that PCMR users visited the clinic more often and were more likely to obtain contraception between pregnancies (Shah et al., 1993). It is also important to recognize Americans' skepticism about the connection between PCMRs and health outcomes. When asked whether they thought the quality of their medical care would improve if the US adopted an electronic PCMR system, only twenty-three percent of respondents thought this was "very likely" (The Public and the Health Care Delivery System Survey, 2009). For this reason—and because past research presents some evidence—further long-term research should test whether the geographic benefits of PCMRs really do improve health outcomes.

However, nearly all PMCR trials have concluded that additional tools are necessary for healthcare professionals to realize their geographic benefits. Several studies noted difficulty when health workers were not fully trained to use PCMRs. In some cases, clinics did not realize potential time-saving costs because untrained employees could not take full advantage of PCMRs (Earnest et al., 2004; Giglio and

Papazian, 1986). Additionally, while PCMRs were very effective within the network of trained workers, some patients found that their network was limited to clinics with trained staff (Shah et al., 1993). On top of this, others have noted the obstacles to integrating separate clinics. For instance, poor road quality greatly undermines the geographic potential of PCMR's in Kenya (Siika et al., 2005). Doctors in England also expressed concerns about their clinics' abilities to agree upon and coordinate a PCMR system (Jones et al., 1999). Similarly, the WHO recognized a need for the standardization of PCMRs when they found that the use of PCMRs led to an over-recording of maternity risk factors (Shah et al., 1993). In these examples, we see that additional infrastructure is necessary to strengthen the geographic framework in which PCMR's operate.

Just as healthcare providers require some added infrastructure in order to use PCMRs most effectively, several other factors facilitate patient use of PCMRs. First, PCMRs must be geared towards their target population. For instance, internet-based PCMRs require computer knowledge and access to a computer at home, thereby excluding some patients (Earnest et al., 2004). The fact that white people were more likely to access internet PCMRs suggests that not all patients have the necessary infrastructure for this type of PCMR (Earnest et al., 2004). Additionally, the content of records must fit with cultural norms: a study in Yemen found that male health care workers could not access the records of female patients because this practice violates cultural norms (Shah et al., 1993). Similarly, privacy for patients is a major concern in the US (Gilhooly and McGhee, 1991). In fact, the majority of respondents in a recent poll said that they would be "very concerned" about their medical privacy if the US adopted electronic PCMRs (Work Trends Survey, 2009). Taken together, these flaws demonstrate a need for comprehensive evaluation of patient needs before implementation of PCMRs.

The American healthcare system could benefit greatly from patient-carried medical records. In a convoluted, complex network PCMRs have been shown to increase communication between patient and provider, improve communication between providers, and reduce medical error. In turn, by refining the geographic healthcare network, PCMRs will also reduce healthcare costs, a common concern of both politicians and patients. Admittedly, it is important to note that research has not proven a positive correlation between PCMRs and health outcomes. Additionally, PCMRs cannot operate most effectively without adequate training and infrastructure for both providers and patients. However, past research has managed to pinpoint numerous benefits and several flaws in PCMR trials. By incorporating this research, healthcare professionals should be able to implement appropriate PCMR systems to satisfy their patients and improve their overall outcomes.

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